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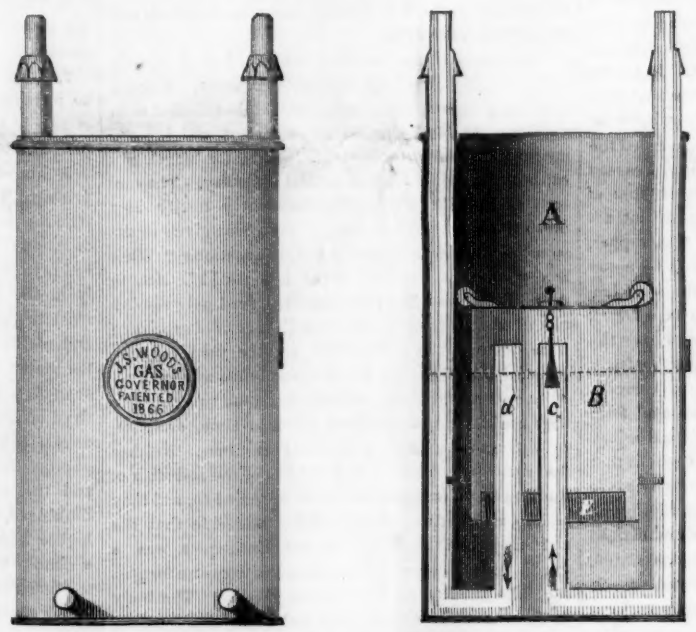
Wood's Gas Regulator.

The engravings presented herewith represent clearly the Gas Regulator lately patented by Dr. Joseph S. Wood, of Philadelphia, Pa., Aug. 21st, 1866.

The first is a view in perspective, the second is a sectional view. It consists of a cylindrical tin or metallic vessel, A, in which is placed a shallow vessel, B, inverted, and arranged to move up and down on the pipes or ways at each side. These extend from above the top of the main vessel, A, to the bottom, and these form a double elbow like an inverted siphon, or U, the short arms each, c, d, passing up under the inverted vessel or reciever, B, nearly to the top. Water or glycerine is introduced in the first vessel till it nearly reaches the top of the short arms of the U-formed pipes. One of the short pipes, c, has a smaller aperature than its bore or valve-seat at the top, and a conical valve is attached to the top of the reciever, B, and operates in this pipe.

The *modus operandi* is thus: The gas entering the right hand pipe, c, at top, is conveyed to the reciever through the valve and pipes, out through the left hand pipe, d, as shown by the arrows. E is a close chamber, one of which is secured in the interior on each side of the reciever, B, to buoy up or balance the weight of the reciever when immersed to the proper point of adjustment. Any increase of pressure in the pipes, c, causes the reciever to rise, together with the valve, which closes upon its seat and shuts off the gas in proportion to the pressure, thus keeping a uniform pressure in the reciever, B, and consequently in the service pipes after the gas leaves it.

It does not require any argument to prove the value of a simple, cheap and reliable apparatus or governor as this is to regulate the pressure in service pipes, and keep it at the proper standard to give a good, steady, and economical light at the burner, and obviate the necessity to run about to turn off the gas at the burners as the pressure varies from hour to hour in the street mains. Another important advantage is the saving in gas which is from 15 to 40 per cent.



WOOD'S GAS GOVERNOR.

This apparatus completely overcomes all former objections to others where a diaphragm is used; or those in which mercury is employed as a seal.

This apparatus can be seen at the office of the AMERICAN GAS-LIGHT JOURNAL, where reference is made by me. Agents are wanted to introduce it at once to whom liberal inducements will be offered.

J. S. WOOD, Patentee.

The Silver Mines of Saxony.

Freiburg, in Saxony, about twenty miles from Dresden, is noted for its mines of silver. These have been opened for nearly a thousand years, and have been among the most profitable in Europe. They are still in active operation, and from twenty to thirty thousand miners find occupation in this tract of the Enzgebirge, or metal mountains. The central part of this town is the huge cathedral, the houses cluster around it, and the picturesque old wall with its heavy towers surrounding the whole. Around the town are mounds of "dirt," squared off neatly, like fortifications; each is crowded by a little nest of houses, and from which a tall chimney protrudes, indicating where a shaft runs down and intersects the galleries. After procuring a ticket, and putting on the miner's dress, not forgetting the leather apron fastened on behind, on which to sit, we began the descent, going first down a ladder four hundred feet in length, and then down other short ladders. The greatest depth of the mine is about two thousand feet. The ore is not found within three hundred feet of the surface. The hill is traversed by horizontal galleries, one under the other, seventeen in all, with shafts running down to them. There were three thousand five hundred men at work in the mine we visited. They were all civil, and greeted us with "gluck auf," good luck. The amount paid these poor miners for their service, seems miserably small. The ablest bodied can earn thirty cents a day for twelve hours work. Yet the people all seem contented. Their wants are slight, barley and rye bread are cheap, meat is little eaten, the beer drank by the peasantry is not expensive, and their three groschen a day, or about eight cents, will supply all the wants of nature. The wives and daughters work in the fields, and the children earn enough for a living when they are seven years old. And so it is that the peasants and miners are comfortable, and in fact are more contented than men who live in an entirely different grade of society. Nor is the life said to be unhealthy. Owing to the improved modes of ventilation, the air is excellent; it is neither cold nor hot, but exceedingly comfortable, and equable, of course, to an extent of which we know nothing on the surface. The most striking objects which we met underground were the great waterwheels which drive the pump. These are about forty feet in diameter, and as we saw them slowly revolving in the darkness, hundreds of feet from the surface of the earth, and heard the rush and the dash of the water, it was inconceivably impressive. There are nine of these, one above another, and the water falls the whole depth of the mine. The arrangement is a simple one. A single steam engine on the outside serves to draw from wells at the surface water enough to make the subterranean wheels turn, for the fall of a small stream several hundred feet gives, of course, almost irresistible power. The water thus introduced is added to that at the bottom of the mine, but the amount is slight compared with that which the huge lifting pumps remove. So thorough is the drainage, that in almost every part which we visited the ground was perfectly dry. In the Freiburg School of Mines, the most celebrated in Europe, are a hundred and five students, of whom thirty-five, or more than a third, are Americans. There is such a demand for educated miners with us, that we can hardly supply it, and so we must undergo the disadvantages of dealing with the subject through the medium of a foreign language. Yet this school, now a hundred years old, sustains the world-wide reputation which it gained under Werner fifty years ago, and can, probably, give a better training than England ever can afford. Here there is the inestimable advantage of actual mines close at hand, and I found a young American at Freiburg who has just come, and who works every day breaking stones from 6 o'clock to 11. This is to train the eye to the quality of rocks, as the breaking involves the throwing away of what is worthless and sorting of what remains. About a half of the Americans here are hard-working young men. The other half are of a different stamp, about a quarter of the whole taking life very easily, and another quarter being utterly given over to drinking, idleness, and profligacy of all kinds, are so noisy and so insolent that they are bringing great discredit upon the whole American name. The other men are quiet and studious, and go on unnoticed; it is only the vicious who are noticed, and tarnish the purity of our national character.

—A gentleman on his annual tour to the White Mountains a year ago, discovered rocks containing gold near Lisbon N. H. A company of Hartford and Springfield merchants was formed, which purchased the property in which the ore was found. The stock worth a year ago $5 a share now sells for $5,000. Some of the quartz yields $867 of gold per ton, and $150 of silver.

On National Standards for Gas Measurement and Gas-Meters.

By GEORGE GLOVER, Esq.,

Formerly Lecturer on Natural Philosophy, Royal College of Surgeons, Edinburgh, and Vice-President Royal Scottish Society of Arts, and Superintending Medical Inspector General Board of Health, Whitehall.

From the London Journal of the Society of Arts, No. 224.

[CONTINUED.]

The "Sales of Gas Act," introdnced by his Lordship, recieved the sanction of the Legislature in the session of 1859. The principal provisions of that act are sufficiently well known. It fixed, for the first time as the "only legal standard or unit of measure for the sale of gas by meter, the cubic foot, containing 62-321 pounds avoirdupois weight of distilled or rain-water weighed in air at the temperature of 62° Fahrenheit" thermometer, the barometer being at 30 inches." And had the act done no more than this it had conferred an important boon on the gas companies, and on the community at large. A first and important step was then taken in the right direction.

The duty of providing standard measures for gas was devolved by the Act on the Lords Commissioners of Her Majesty's Treasury. The Astronomer Royal's familiarity with the subjects of the standards of weights. and measures specially qualified him for such a duty, and his services to the Exchequer in connection with this subject having been acknowleged as of high value, their Lordships applied to him to assist them in providing the requisite instruments. The public and the gas companies were entitled to expect that the services of a philosopher so distinguished in the application of the exact sciences, should be made available to attain in the standard measure of gas, as much accuracy as possible.

Acting under the authority of the Lords Commissioners, and aided by Paofessor Miller, of Cambridge, the Astronomer Royal provided a bottle for measursng the cubic feet defined in section ii. of the Act. In his report to their Lordships of the 11th of February, 1860 he says, "Acting under the authority given by your of October 14th and 15th, 1859, and having secured the valuable assistance of Professor W. H. Miller, I caused to be prepared a weight of 62-321 lbs., constructed of hard gun metal, and a metallic vessel or bottle, intended to contain 1 cubic foot, constructed of thin copper, in shape, a cylinder with a cone at each end, the upper cone having a small cylindrical neck for the introduction of water, and the lower one having a tap for its discharge." Whether the bottle so described was the best instrument for the purpose may, I think, be fairly questioned. Made of copper it is liible to corrode. The thin sheet of copper was liable to change of form when filled with water, as well as from external injury Once filled it could not be readily dried. I submit that a geometrical solid, made of anti-corrosive metal, made to exclude, not to contain, the water, and losing its weight the precise quantity of distilled water defined in clause ii., would be free from the objections stated, and could be easily dried after each experiment. It could be preserved, if laid on a soft cushion, under a glass, at the Exchequer, for any length of time, without change or diminution.

Having obtained a bottle fitted to contain the "unit of measure" required by section ii. of the Act, the Astronomer Royal's next step was to apply it in accordance with section iii., which requires that, "within three months next after the passing of the Act, models of gas-holders, measuring the said cubic foot, and such multiples and decimal parts of the said cubic foot, as the Lord High Treasurer or the Commissioners of Her Majes;y's Treasury shall judge expedient, shall be carefully made, with prôper balances, indices, and apparatus for testing the measurement and registration of meters, and such models shall be verified under the direction of the Lord High Treasurer or the said Commissioners, and, when so made and verified, shall be deposited in the office of the Comptroller General of the Exchequer at Westminster."

In carrying this enactment into effect, it was found that none of the gas-holdeas hitherto in use for testing meters could be adopted as a standard measure. The more prominent odjections to them were these:

1. Their measuring part was not truly cylindrical.

2. No two gas-holders agreed in measurement. Not only did they differ from each other to the extent of 3 or 4 per cent. in their measuring capacity, but the various divisions into feet, and the sub-divisions of the feet, differed in the sane gas-holder.

3. The material of which they were made was very liable to corrosion when in contact with gas and water. To retard this corrosion paint was used. The paint in the inner surface of the bell diminishes its measuring capacity, and its renewal fron time to time aggravates the evil. Tre coating of paint softens, swells, frequently rises in blisters, falls off in flakes, or crumbles away. In its ascent from the cistern, the painted surface of the bell brings with it a quantity of water, which adheres to it in the form of a film, and numerous drops, which adhere especially to the inner surface of the flat cover. These occasion further diminution of capacity, whilst the evaporation of the water on the outer surface of the bell lowers the temperature, diminishes the volume of the gas obtained, and causes error in the testing of meters.

4. The scales of the existing gas-holders were found liable to corrosion, and, not being attached to the bell, they could be readily tampered with. These reasons were sufficient to preclude their adoption as staudard measures.

The construction of such instruments as the Act required becoming daily more pressing, and urgent representations being made to the Treasury on the subject, I submitted my designs to the Astronomer Royal, and I had the honor to be employed by the Lords of the Treasury to superintend the construction of the "national standard gas-holders, with proper balances, indices, and apparatus for testing the measurement and registration of meters."

The idea of a legal standard measure, I need scarcely say, involves the highest attainable accuracy. Neither the Legislatura nor the public would de satisfied with anything short of this. The subject of weights and measures, even for solids and liquids, for length and capacity, is one of much practical difficulty. The records of the Royal Society abundantly testify how much time, labor, and thought have been given to the solution of these apparently simple questions, "What is a pound weight?" "What is a yard?" Not to travel back into the remote past, I need only remind you of what happened when the Houses of Parliament were destroyed by fire in 1835, and the yard measure perished with then. A Royal Commission was appointed to restore it. After deliberating some twelve years they could find nothing fixed, either in time, or space, to which to appeal for a standard measure. Neither the seconds pendulum nor the arc of the meridian of the French philosophers could be appealed to, and they had no alternative but arbitrarily to decide that the rod they had deposited at the Exchequer was a yard. But in constructing a standard measure for gas, the difficulties are much more complicated. The body to be measured is an aëriform body, invisible, highly elastic, varying in volume with every barometric change, very complex in its chemical constitution, affected by every change of temperaiure, liable to condensation and to be absorbed by water, of which it is also an absorbent.

To be continued.

The Process of Roasting Ores.

Translated from the German of F. Plattner, for the MINING & PETROTEUM STANDARD AND AM. GAS-LIGHT JOURNAL, by

J. H. TIEMANN.

NUMBER II.

[General remarks upon the changes which finely pulverized ores or mill products undergo, when roasted in properly construct furnaces.]

When finely pulverized ores or mill products consisting chiefly of sulphur metals, are roasted in a reveberatory furnace with a horizontal hearth, upon which they are spread several inches in depth, at a temperature which exactly serves to cause the sulphur and the metals in combination with it to absorb oxygen from the air passing over them, free meatloxides, and generally sulphates are formed, while sulphurous acid is generated which has but a slight affinity for metallic bases; many arsenic metals act in a similar manner, either free oxides and oxides in combination with arsenic acid are formed, together with the generation of arsenious acid, or only oxides in combination with arsenic acid, (less frequently arsenious acid.) Many sulphur metals also, in combination or united with sulpho-arsenic metals, change to sulphates, and arseniates, or to free oxides and arseniates. Under certain circumstances antimoniates appear to be formed, when for instance the ore to be roasted contains sulphur metals combined with sulphantimony, or which in general contains a sulphide of antimony, which when roasted alone as is well known, changes to a compound of antimonic acid with the Teroxide, while a portion of the Teroxide passes off in the form of white vapors.

It being a condtion that the air necessary for the oxidation of the sulphur and arsenic metals should have free access, it would seem at first sight to be more advantageous to have a muffel-shaped roasting furnace heated from the outside, in preference to one where a flammable fuel is used and the flame passes directly into the furnace, but upon closer investigation this is found not to be the fact.

Although in a roasting furnace of the first named description, a so-called "muffel furnace," the conditions may be fulfilled by which an oxidation of the sulphur and arsenic metals is possible, inasmuch as pure atmospheric air can be brougnt in contact with the ore, and the admisson of a greater or less quantity is completely under control; there are three circumstances worthy of particular notice.

1, That for the proper heating of the muffel a larger amount of fuel is necessary than where the flame passes directly into the furnace.

2, That the temperature of a muffel furnace cannot be increased or diminished as desired, which is so necessary in many roasting processes, in which at certain periods a higher or lower temperature is required.

3, That the heating of the substance to be roasted is principally from the hearth, which is highly disadvantageous for many ores and mill products which sinter or smelt. The muffel furnace therefore is to be preferred to the ordinary flame or reverberatory furnace only in the following cases. First, when it is desired to roast arsenic and sulphur metals, especially cobalt and and nickel ores, arsenkies etc., with stone coal and at the same time avoid impurifying with soot the resulting arsenious acid, (giftmehl), metallic arsenic, and suboxyd of arsenic. Second, when in roasting sulphur metals (Schwelfelkies Zinkblend &c.,) the resulting sulphurous acid is to be conducted into leaden chambers and there converted into sulphuric acid; though for Zinkblend, which requires for its complete roasting a higher heat and longer time, the furnace is built with a double hearth, where for the better economising of the fuel the gaseous products of combustion which pass under the lower hearth are allowed to pass directly into the upper one. Third, when the ores or mill products are rich in silver, and there is fear of loss in silver by volatilization by the passage of the heated products of combustion directly over the ore.

In most cases the object is obtained by using an ordinary reverberatory furnace, having a roasting space of proper height and whose roasting surface and the open working doors or other openings for the admission of air, bear a definite relation to the opening in the stack or chimney, and which has besides a good draught. The flame passes from the fire-box over the fire-bridge into the roasting chamber, always with some undecomposed atmospheric air, it diffuses itself at first through the whole space, but when the latter has be come sufficiently heated, it ascends in waves to the arch, where the oxygen of the undecomposed air which has passed into the chamber is absorbed by the inflammable gases and carbon, making the flame illuminating, and the ore, which is spread on the hearth 6 or 8 inches deep, is heated by the radiated warmth. At the same time air is admitted by the working doors or openings made for that purpose; this air being cold and conse-

quently denser than the burning gases, forces itself between the flame and the ore, causing a complete combustion of the carbon in suspension and the still unignited gases, to carbonic acid and hydrogen, thereby increasing the temperature and heating the ore more thoroughly. At the same time the temperature at the arch is increased, for the specifically light gaseous combustible prodncts pass upwards through the gases which constitute the flame and thus give an opportunity for other portions of the flame to become ignited, so that the flame on its way to the stack loses indeed its illuminating property, but in its stead develops new warmth. The gaseous combustible products hydrogen and carbonic acid, which enter or are formed in the roasting chamber pass off up the chimney in connection with the remaining undecomposed atmospheric air and the nitrous oxyd-gas which has been generated, in the same ratio as new qualities are formed. Is the roasting chamber of such a height that a larger quantity of air is admitted than is necessary for the combustion of the gases and burning particles of carbon in the lower part of the flame, a part of the oxygen of the air causes an oxidation of the ore, the gaseous products or vapors thereby formed, heat being at the same time generated, pass up the chimney with the gaseous products of the fuel, the libera'ed nitrous oxyd-gas and the remaining undecomposed air.

The British Association.

The British Association for the Advancement of Science, lately held at Nottingham, had presented among other matters the following regarding the adoption of the metric system in America.

THE METRIC SYSTEM.

On motion of Mr. J. F. Heywood, resolutions were adopted expressing gratification at the progress made in America, where legislation sanctioning the use of the metric system had take nplace; and recommending that committees of the association should be authorized to communicate with foreign countries in the manner proposed in the report. It was also determined to apply for a grant of £50, the cost of the instruments constructed by Mr. Cassela being in the first instance £5 5s. each.

In the course of the discussion which took place it was remarked that the United States, in recognising by legal enactment the metric system, and distributing standards throughout the states, were only following the recommendation of the British Association; whereas, through the course which had been adopted in this country, it really seemed as if we were learning the principles of the metric system from the Umited States. also the following in regard to

GUNS AND PROJECTILES.

Captain Noble read a paper "On the Penetration of Shot and Resistance of Iron-clad Defence," in which he detailed the results of experiments on iron plates made by the Ordnance Committee. The experiments were directed to the solution of the power of resistance of iron plates to steel shot and it was proved that 4 1-2 inch and 5 1-2 inch plates might be perforated with heavy shot at low velocity, and by light shot at high velocity, while the latter was probably the most effectual agent. These results had been obtained by direct firing, and in regard to oblique firing it was found that a much greater force of shot was required to perforate. The difference between cast iron and steel shot was in favor of the latter, and, in fact, it was useless to employ cast iron against armor plates. But Palliser's chilled iron was found to be as good as steel. In regard to the power of shot, the pointed shape was found to be superior to both the flat, and the hemispherical-headed shots. On the whole, the result of the experiments which had been made was that iron plates could, as a rule, be penetrated by steel projectiles from a 12-ton gun, whether heavy at a low veloecty, or light at a high velocity.

—We lately met a grammarian, says a California paper, who had just made a tour through the mines, conjugating, or rather, cogitating, thus: "Positive, mine; comparative, miner; superlative, minus!"

The American Association.

Abstract of a paper on "The Utilization of Sodium in gold and silver amalgamation," read before the Buffalo meeting of the American Association for the Advancement of Science, by Prof. HENRY WURTZ, *of New York City.*

Very much discussion has been going on for about a year past, arising out of my recently announced discovery of the extraordinary effect of the alkali-metals in amalgamation. Confirmations of my results from the most reliable sources have appeared abundantly; as well as various criticisms, objections, and even what are represented as negative results.

I desire to present a very concise statement of the progress of these things, believing the Association will not fail to be interested in a subject having such vital relations, at present, to the prosperity of our country as the successful saving of gold and silver.

Prof. B. Silliman reported last January, at the meeting of the National Academy of Science at Washington, the first actual working results with sodium made public in this country; although it seems that the new method, divulged to divers persons several years since, had already been actually adopted during the year previous, in Wales, California, and elsewhere; the value of the discovery being so easily tested and so obvious that heralding and puffery were not needed to bring it into notice. The communication of Prof. S. was extensively copied, and is referred to now to introduce a continuation of his experiments in another form; in order to ascertain whether the assays of the tailings after amalgamation would give comfirmatory results. The following report from Dr. Torrey is introduced as embodying such result.

NEW YORK, Jan. 28, 1866.

Prof. B. SILLIMAN,

Dear Sir.—We send you the results of our assay of the "tailings" which you transmitted to us. They were marked, "Tailings from ore of Auction and Texas Lode, which assayed gol l $320." After amalgamation with sodium quicksilver, assayed,

Gold, per ton, - - - -	$67.83
Silver, " - - - - -	1.45

Yours respectfully,

JOHN TORREY & SON.

It will be found on reference to Prof. S.'s report that the ore alluded to was one from which the ordinary mode of amalgamation produced but from 57 to 60 per cent. of the assay, whilst my method produced from 80 to 83 per cent.

The following is a letter from Prof. Silliman, relating to trials on a working scale, instituted under his advice and direction at some mills in the Pacific States:

"NEW HAVEN. Feb. 26, 1866

"Prof. HENRY WURTZ,

"*Dear Sir.*—I have recieved advices under date of Jan. 17 and 27, 1866, from Dr. Fisher in Grass Valley, California, the gentleman I requested to put to the test your new methods of amalgamating gold ores with quicksilver containing sodium, and find therein the following passages bearing upon your invention.

Under date of Jan. 17:—'Upon applying No. 1 amalgam directly to the clean copper plates, they amalgamate easily and retain their coating better than when coated in the ordinary manner.

'As I advised you in my last, the 'Eureka Mill,' or any other in which the 'blanket process' is employed cannot give the sodium amalgam a fair test so far as its value in saving gold on an incline is concerned; for 90 per cent. of the gold saved is detained by the blankets.' * *

'Parties have been experimenting in Nevada, for some time past with sodium. At the Gould & Curry mill, they tried sodium-amalgam in the Hepburn pan (1000 lb. charges of ore) with very satisfactory results. After ruuning six hours at a temperature of 150°, the contents of the pan were run off, and the yield of silver was ten per cent. greater than when operating as usual! Mr. Attwood tells me that his son, amalgamator at the Ophir mill in Virginia City, has obtained some still better results with the Freiberg barrel.'" * *

"Under date of Jan. 27, 1866:— * * 'It seems to me that the great value of sodium will prove to be in pans and barrels and on copper plates. *Last week, in my experiments at Eureka the gold amalgam from the plates coated with sodium-amalgam weighed seventy per cent. more than that from plates coated in the usual way!!* * * Yours truly,

B. SILLIMAN."

The following is the substance, greatly condensed, of a report of Dr. John Torrey:

Experiments upon ore from the "Moss Lode," Arizona.

U. S. ASSAY OFFICE, N. Y., Feb. 28, 1866.

Prof. H. WURTZ,

We herewith send you the results of our experiments upon the comparative value of the new method of amalgamation invented by you, and the old method with ordinary mercury. The ore operated upon assayed,

Gold, per ton, (2000 lbs.).....	$1,072.00
Silver,.....	30.00

First Experiment—A quantity operated upon by amalgamation in the ordinary way, and the slime treat-laboriously for *sixty minutes*, to collect the gold amalgam, yielded: Fine gold, per ton, $470.00; equal to 45 per cent. of the fire assay.

Second Experiment—Another equal quantity, all else the same, except that sodium-amalgam was used, *forty minutes* only being occupied in separating the gold-amalgam from the slime, gave: Fine gold, per ton, $817.50; equal to 78 per cent. of the fire assay.

Third Experiment—The tailings from the first experiment (much having been lost, however,) amalgamated with the aid of sodium, yielded: Fine gold, per ton, $134.00; or 14 per cent. additional of the fire assay.

These results, and not a few others of a similar kind, show conclusively the efficacy of your new mode of amalgamation, and its great superiority over the usual method in which ordinary quicksilver is used.

Yours respectfully,

JOHN TORREY.

The California metallurgist, Mosheimer, published last winter the following results obtained by him:

"About five months ago I received several lots of ore to work; and I determined to give sodium a fair test. I worked the same ore, side by side, with the same machinery, and the results were as follows: First lot of 500 lbs., each pan with sodium, yielded 85 per cent. of the assay; without sodium the yield was only 55 per cent. Second lot, different ore, with sodium, 80 per cent.; without sodium, 60. Third lot, different ore, with sodium, 78 per cent.; without sodium, 65. I made many more trials, and found that I got from 5 to 25 per cent. more by using sodium than I could obtain without its aid. I noticed a very great difference, however, in the different kind of ores which I worked. For certain classes of ores I believe sodium to be of great benefit; less for others.

J. MOSHEIMER

The daily *Alta Californian* of March 17. 1866, commenting upon Prof. Silliman's results, says as follows: "It may be asserted with confidence that if the results of the general working of gold quartz are as favorable as those of Prof. Silliman's experements, the gold yield of California will increase from $5,000,000 to $10,000,000, annually.

There are vast amounts of auriferous quartz that contain barely gold enough to pay for the expense of crushing and reducing, leaving no margin for extraction or profit. If the yield can be increased ten per cent. only by using sodium, the mining of the rock will pay; and the quartz that now comes within fifty cents per ton of paying expenses, is far more abundant than richer qualities."

The *Alta* also says, "We add to that of Prof. Silliman the experience of R. B. Gray & Co., manufacturing jewelers of this city. They have been in the habit of reducing the "sweeps," that is, the sweepings and refuse of their establishment, into which considerable quantities of the precious metals find their way; and at the last reduction, after the sweeps had been put through the regular process, and were ready to be thrown away according to custom, an experiment was tried by working them over again with sodium. The result was that nearly as much gold was obtained from the second process as from the first. This work was done in a Knox amalgamating pan."

In the special correspondence of the San Francisco *Mining & Scientific Press*, of May 12, 1866, in speaking of the Church Union Gold Co., in El Dorado Co., it is said that "Mr. Jessup, the agent and correspondent of the company, informed me that the superintendent had also been very successful in the use of sodium in amalgamating, *not only within the batteries, but only elsewhere wherever used.* Both of these gentlemen testifying in its favor and taking the greatest possible pains to point out its advantages."

Another correspondent of the same paper, under date of May 27, 1866, speaking of the "Yuba Mill and Mine in Yuba Co., says: "Mr. Leland (the Super-

intendent), acting from suggestions in your journal, has been giving attention to the action of sodium-amalgam, and is satisfied it is just the thing for saving the gold in the fine flour state."

Late advices received through the public prints from the great Gould & Curry Mine and Mill, state that in the month of May this mill crushed and amalgamated 3600 tons of rock which worked within eleven per cent. of the assays. This statement becomes very significant when it is known that, as my private correspondence shows, Mr. Louis Janin, the Superintendent of the Gould & Curry, has for many months been *making* sodium in a small way for the use of his mill.

The Black Hawk (Colorado) *Mining Journal* of June 26, 1866, says: "By the use of sodium-amalgam, the yiele of the Narragansett Mill has been increased more than 30 per cent." And in the issue of July 3d, further details are given of the results in this mill, as follows: "In one section of twenty heavy stamps, Mr. Emery, the Superintendent, used the sodium-amalgam for two batteries, and the common mercury for the other two, during a run of three days, obtaining from the former five ounces of amalgam more than from the latter, which retorted $6.50 an ounce, or $32.50 in all." It was also remarked that probably "this result would be even better with more experience," a remark which may be pronounced emphatically sensible and correct. I may add that as the Narragansett Mill consists of forty stamps; if sodium were used in all, according to even these first crude results, the annual yield of this mill would be increased (allowing twenty-five days for cleaning up) by nearly $15,000 in gold, equal to $375 per head of stamps.

With these ores, however, far better results will be attained by amalgamation in pans, or by some other method involving a degree of comminution far greater than that of the battery. The *Journal* of the same date says that "Mr. John P. Bruce is running his old twelve-stamp mill, two batteries, six stamps in each. For four days last week he used the mercury treated by sodium amalgam in one battery and common mercury in the other. He got 1 oz. 19 dwts. more gold in the former than in the latter." This is about $40 more in gold, or an increase of about $560 per annum per head of stamps.

Letters have been received from Mr. Bruce, who is one of the oldest and most reliable of the Colorado mill-men. In one he says, after relating the above result in his battery: "I am putting into the mill one of the Bertola pans, and will have it running this week. I expect big results from the amalgam with the pan. I think every mill in the mountains would use the amalgam if anybody had it to sell." Later, under date of July 17, Bruce says: "Everybody believes the amalgam to be the best thing yet, and everybody would buy it were it for sale here. You can rest assured the amalgam is all right.—Last week I used ½ oz. of amalgam to 2 lbs. of quick, (quicksilver,) and I think a half ounce to 2 lbs, is better than 8 ounces to 2 lbs. quick." Under a still later date, July 30, he says: "The amalgam is doing nicely for me. The longer I run the mill with it, the better I like it. The ore is what we call white quartz, with some copper and white iron pyrites. The Black Hawk Co. like the amalgam very much, and will use it all the time. Col. Grafflin has some to try on his ore soon. I will send reports from him as soon as I can get them. Every one thinks well of the amalgam, who has had it to use, with two or three exceptions, and I think they did not care to use it."

A recent letter from Prof. Wm. P. Blake, of San Francisco, says: "Sodium-amalgam is growing in favor, though many have not been pleased with the alloy they have used," appearing to imply that those parties who have been infringing upon my patents, have palmed off upon the miners impure or spurious preparations.

American metallurgists, however, are not altogether unanimous in admitting all the advantages I claim for sodium. Kustel, known as the author of a work on gold and silver metallurgy, seems bitterly opposed to its use upon *silver* ores. In his experiments, however, Kustel has fallen into the error that the use of sodium, to quote from him, "in the *decomposition* of silver ores" is based upon "its ardent desire for combination with oxygen, sulphur, etc." It was never proposed by me to use sodium for the *decomposition* of silver or any other ores. The addition of sodium to the quicksilver used in amalgamating silver ores, in sufficient proportion to enhance the adhesion of the quicksilver to the metallic silver which has already been separated from the sulphids, etc., by other agencies, will be found highly beneficial; as well as the addition of magnetic quicksilver to a pulp or slime which contains a floured or pasty silver-amalgam diffused throughout its mass, for the purpose of collecting and incorporating the silver amalgam into one mass.

Should enough sodium be present to produce the decomposing effect on the silver sulphids by sheer force of chemical affinity, which Kustel regards as the object of the invention, the real object would inevitably be defeated, as the quicksilver would then become loaded with the baser metals and other impurities, which would destroy its amalgamating power altogether. This is evidently what has actually taken place in some experiments on silver ores which Kustel reports in the San Francisco *Mining Press* of March 31, 1866, in which he obtained with sodium but one-third as much silver with a given ore as without it.

Kustel's results, therefore, having been founded upon an incorrect idea of the mode of employment of the sodium, have no applicability either *pro or con*. Kustel's statement that contact with iron "highly increases the rapidity of the decomposition of water by sodium-amalgam" is at variance with my own observations, which have generally tended to precisely the opposite conclusion; and his inference therefrom, that iron pans therefore cannot be used with sodium, is shown to be fallacious by numerous practical results on record.

Another fanciful objection of Kustel is "amalgamation with the iron of the stamps or shoes." I have shown that no "amalgamation" of iron takes place, but a merely transient enfilming, which is extremely beneficial instead of prejudicial. Kustel admits the prevention of flouring of the quicksilver, and concedes also "that one or two pounds of sodium in a ton of quicksilver will undoubtedly show a good result if *gold quartz* is treated with it properly."

The *negative* results of one experimenter, especially when based upon an incorrect understanding, weigh but little against the concurrent positive results of many others. To show that others, versed in the amalgamation of silver ores, do not concur with Mr. Kustel in his opinions, I shall quote Mr. S. R. Kimball, a conductor of important metallurgical works in San Francisco, who writes April 14, 1866, to the *Mining Press* of that city, as follows: "I have probably had more practical experience in the use of sodium for extracting the precious metals than any other man, and I have been very much excited by its beneficial results. As Messrs. Silliman and others have given several statements of practical workings, it is unnecessary for me to make any; I am satisfied they are correct, as they correspond with my workings, both with and without sodium. I notice my friend, Mr. G. Kustel, has been making some experiments with sodium on argentiferous ores, with rather poor results. I hope he will not discard its use with making more experiments with different proportions. If he does this I think he will agree with me."

Another California writer has thrown out the suggestion that the difficulty of enfilming the particles of gold with quicksilver is due to strongly adherent films of air; and having observed, he says, that certain metallic powders are more easily wetted by *water* when the latter contains a caustic alkali; he imagines some obscure analogy between this case and the enfilming of gold by quicksilver; and then reasons therefrom that the virtues of the sodium must be wholly attributable to the *caustic soda* formed by its oxydation, and that the latter may be substituted for it. Had he made *experiments* upon some native gold before making his hypothesis, the latter would probably have never been made. The air-film idea occurred to me early in my investigations; but finding that under alcohol and *in vacuo*, the refractory gold did not amalgamate better, I abandoned it. I may add that the effect of sodium is the same when no water is present at all.

In England, also, some results of practical workings have been brought out. Mr. Thomas Belt writes, Jan. 16, 1866, to the London *Mining Journal*, among other things, that in comparative experiments made upon 500 lb. lots of auriferous galena which assayed something over 13 dwts. of gold per ton, quicksilver alone extracted but 6½ dwts.; and with sodium 13¼ dwts., or the whole content.

Mosheimer has communicated to the press results of other Welch experiments. He says:—"T. A. Readwin wrote to me about eight months ago, that he is making experiments in North Wales, England, with sodium-amalgam. He informs me that he uses small iron pans and my amalgamators; an equal number of pans being worked with and without sodium. The result has been that at least 30 per cent. more gold was produced with sodium than without its use. He has promised to give me further results of his experiments as they transpire, which in due time, Messrs. Editors, I will transmit to you."

There are in England, however, also a few who cavil at the new innovation. A correspondent of a London *Mining Journal* objects chiefly, so far as he can be understood, because the "sodide of gold" has not yet been discovered. Another oracularly writes that "the sodium process is alike unphilosophical and commercially impracticable." I shall but refer briefly to the conflicting claim to priority of discovery which was entered by Mr. Wm. Crookes, one of the most learned, industrious, and successful of the English scientists. The graceful concession of this point, which Mr. Crookes is considered of late, both by scientists and jurists, to have made; by his own silence, and by publications in the journals ostensibly authorized by him; it is thought will not prove any appreciable detraction from the laurels so well and worthily won by him in the field of chemical discovery.

The most surprising articles elicited by this discovery in transatlantic journals, have emanated from certain persons who have denied the authenticity of the discovery altogether, and claimed that the use of sodium in amalgamation of ores has already been a matterof publicity for centuries! Mr. John Calvert and another writer (anonymous) have put forth the astounding assertion that extracts can be "given from more than 100 works in various languages," showing that not only sodium but magnesium has been used in this way from time immemorial. Three works are referred to by name —Schwartz's "Alchymia de Salabus," Albaro Alonso Barba's "Art of Metals," and Roger Bacon's "Ars Omnia." Schwartz's book probably does not exist upon this continent, but I was fortunate enough to find a copy of the very edition of Barba referred to, in the hands of Prof. George J. Brush, of Yale College, who kindly lent the precious volume, and I now exhibit it to the Section. As could have been anticipated there nothing in it indicating, in the remotest manner, a knowledge of sodium, much less of its use in amalgamation. I must, however, express my surprise, to find that at the time this book was written, in 1640, almost every refinement in the art of amalgamation, and in other branches of gold and silver metallurgy practiced at the present day, excepting the use of sodium (and not excepting many supposed to be especially of modern origin) was known and used by Barba and his contemporaries. As regards the still more ancient work of Schwartz referred to, I can merely remark that I believeit may be said with reason that a person of of lively imagination could find plainly set forth, in the jargon of the alchemists, every one of the discoveries of the nineteenth century, beside a multitude of other discoveries, either yet to be made or never to be made.

The third work named, that of Roger Bacon, it appears has never been published, but exists, according to Mr. Calvert, as a manuscript of immense magnitude; from which he copies the following from a passage on "The metal of salt." under the heading of "The magic of salt:" "It is well that the vulgar un

dertsand not the good and great art of salt, as if it were known to all, riches would no longer be held rare or respected, as with this metal much gold can be obtained, and such great virtue doth it contain, that one piece of such size that will cover the top of the small finger will work wondrous magic throughout a great mass of such worthless stuff that no man would buy for the smallest coin; yet when this and other metals well known to all men, shall lovingly and speedily unite in one common mass, then the adored of all metals becomes life, and is born unto man, and true and real gold may be taken from these common metals without loss to them in weight or virtue, so that by great craft, cunning and magic, not enjoyed by common men, good gold, never again to be lost, is transmuted from the vilest of dross; and so men may enjoy riches without prying into others' money-bags or borrowing from those who have little to lend."

This is of course, set forth by Mr. Calvert as his own translation of the original Latin manuscript, and is interpreted by him as relating to the extraction of gold from ores by amalgamation; but I cannot recognize the possibility of any such interpretation, and believe, that all attentive readers will concur with me in regarding it rather as describing merely one of those obscure and apochryphal methods of transmuting other metals into gold, in which the alchemists so abound; and I here suggest that, even were it an unmistakeable description of the use of sodium in amalgamation, it would still have no bearing whatever on the question at issue, not being cited from a *published* work, but from one which has probably been as much concealed from the public eye as if it had been newly exhumed from the catacombs of Egypt.

I cannot, moreover, help saying, that the tendency extant in some quarters to exalt the chimæras and fantasies of the alchemists into the rank of oracular utterances—thus erecting a sort of chemical mythology—is as much to be deprecated as would be an opposite tendency to underrate and ignore the few kernels of good grain which they really did sow by the wayside, and which have since sprung up and borne such goodly fruit.

The last branch of the subject I shall touch upon relates to the recent and wonderful announcement from an unknown source, so widely and persistently paraded in the public press, of the amazing *explosiveness* of the amalgam of sodium; one of the most prominent of the New-York dailies having, for example, set forth in a leading article, that while metallic sodium is a "harmless substance" (an erroneous statement so very grave and fraught with danger as to be inexcusable even on the plea of ignorance) on the other hand, "the terrors of nitro-glycerine itself dwindle into insignificance when compared with those of the new compound termed sodium-amalgam:" and that one ounce of sodium-amalgam is equal to twenty-five pounds of gunpowder," and similar rubbish *ad nauseam*. With regard to this latter comparative statement, I would remark that, according to this, the samples of sodium-amalgam lying on the table before me are equal to six tons of gunpowder, and that I have often made with my own hands and in one operation, in one day, a quantity equal to 100,000 pounds of gunpowder. My only object in even alluding to a matter which I am aware is to a chemist merely

"A thing for laughter, fleers, and jeers."

is to explain the object and origin of such a fantastic and apparently puerile hoax. It was simply an ingenious but futile *commercial trick*, the motive for it having been the hope of embarrassing the transportation and introduction of amalgams of sodium into the mining regions, by those legitimately entitled to introduce it; until the completion of certain arrangements for infringing upon the patent rights that have been granted by the United States in the premises.

In the course of Professor Wurtz's remarks he was interrupted by questions from Professors Stoddard, Perkins and Hadley. At the conclusion of the paper, Dr. President Barnard remarked that he felt great interest in the discovery made by Professor Wurtz, and thought he might be regarded as one of the benefactors of the world in making two grains of gold available where there was but one before. In response to an inquiry, Professor Wurtz said that the discovery would lead to an extensive development of the manufacture of sodium, aluminum, magnesium, calcium, &c.; to render them cheap and useful in the arts.

Foreign Scientific Items.

Translated for this Journal by

PROF. HENRY WURTZ.

V. Products from Gas-Tar.—Kletzinski in the *Technologiste*, has communicated an account of experiments on aniline and other tar preparations, which is made especially interesting by the numerical details given.

100 parts of gas-tar furnished 1¼ parts of benzole $C^{12} H^6$ and three parts of the liquid called benzine.

100 parts of benzole and 200 parts of nitre acid of 48° Baume, mixed with precaution, and washed after the reaction to remove the orange-yellow product, furnished 100 parts of pure nitro-benzole (theory requires 150 parts) or the "artificial oil of bitter almonds," or "essence of mirbane."

100 parts of nitro-benzole, 125 parts of concentrated acetic acid and 180 parts iron-filings, after digesting many hours, furnished on distillation 75 parts of crude aniline. This material, neutralized by commercial muriatic acid, and the chlorohydrate of aniline dissolved in water, filtered to separate oleo-resinous impurities, evaporated, slightly neutralized by milk of lime and distilled, furnished, after rectification, 70 parts of pure aniline $C^{12} H^7 N$.

100 parts of aniline, treated with 200 parts of arsenic acid (trihydrated,) furnished on careful and gradual distillation for many hours 150 parts of a crude mass, from which there may be finally extracted, 50 parts of chemically pure *fuchsine* (rosaniline.) The best mode of purification is as follows:

The crude mass, which is pitchy in consistence and purple in color, is dissolved in pure dilute muriatic acid. The liquid after filtration, is neutralized with carbonate of soda, avoiding all excess; upon which there remains in solution arsenite and arsenate of soda and chloride of sodium, with a little sal-ammoniac and rosaniline; while the greater part of the latter separates in the form of viscous masses of a brilliant metallic green. This product is then boiled many times successively in a saturated solution of common salt, in which rosaniline is almost insoluble, until so much purified that a sample no longer shows any arsenic present when tested in Marsh's apparatus. The purified rosaniline may be crystallized from acetic acid or alcohol. If dissolved in water acidulated with nitric acid, and a warm concentrated brine of common salt added, hydrate of rosaniline (fuchsine) will separate in small green-gold colored scales, of a beauty altogether extraordinary.

100 parts of fuchsine and 100 parts of aniline submitted to long continued gradual distillation at a gentle heat, furnish 150 parts of a crude mass of a blue color and coppery lustre, which first washed with cold moderately dilute acetic or chlorohydric acid, then boiled with acetic acid, and finally washed with very-dilute cold intric acid, gives after purification by alcohol or fusel-oil, 100 parts of crystals of *aniline blue* (cyaniline, azuline). On neutralizing the acid employed for washing the crude blue, with soda or ammonia, there separates a violet coloring matter which may be crystalized from acetic acid (*parme, violet de l' imperatrice*). By shortening the duration of the distillation, and by prolonged digestion during the preparation of the crude blue, we possess the means of obtaining products of numerous shades of violet.

VI. Purification of Crude Paraffine.—In the same connection Kletzinski gives some highly impor- results of experiments on paraffine. After alluding to the well-known means of separating empyreumatic resins and heavy oils of tar from the crude brown paraffine, by drenching with benzine and passing through a centrifugal apparatus; boiling with sulphuric acid, etc., K. indicates the following new methods as the most advantageous, according to his experiments.

1st, The crude paraffine is fused, and about ten per cent. dry pulverized *chlorid of lime* introduced. The mass is bleached with abundant evolution of oxygen gas. This *bouillie* of fused paraffine and chloride of lime is poured into dilute muriatic acid, and on boiling the mixture, the bleached and purified paraffine rises and swims upon the surface, and may be removed after cooling.

2nd, The crude paraffine is heated with ten times its weight of fusel-oil to ebullition, and the solution filtered warm. The tarry and pitchy impurities, being insoluble, remain on the filter. On cooling, pure paraffine separates, whilst the heavy oil remains in solution, After the separation of the crystallized paraffine from the brown mother-liquor by filtering and pressure, it suffices to break up the loaves as they come from the press, once or twice again, in order to obtain finaliy, after fusing to drive off the adherent fusel-oil, a paraffine of a lustrous white and perfectly pure.

To be continued.

Reese River.—Northumberland is the name of a new district just located in Nevada, in the Smoky Valley range. Seven ledges were located by the discovery party, all of which were grouped in an area of about half a mile, on the northern side of Charnock's Pass. The ledges are apparently large, ranging from five to ten feet thick, and they all crop out above the surface, and several of them may be traced for a considerable distance. The ore from the surface is peculiar in color and appearance, and would seem to hold a fair amount of silver, but development and tests will determine its character. The veins occur in slate, of which there is a narrow belt, from a half to three-quarters of a mile in width, which cuts the porphyry and other volcanic rocks. The party discovered no quartz outside of this belt of slate. Cedar and nut pine are quite plentiful, and the trees stand near the foot of the low hills and in the ravines. The district is very accessible from the Pass, and all of the ledges, which are located on low hills, may be reached in a wagon. W. Cumming has been elected Recorder of the district.

Brevities.

A dispatch from Mobile says that on the 2nd instant on the Florida coast, fifteen miles from land, an island was thrown up by a volcanic influence to the height of ninty-two feet above the water level, and measuring seventeen hundred feet in circumference.

—A locomative lately run the distance from Berlin to Hartford in fourteen minutes, or nearly a mile a minute, under steam produced by peat fuel.

—Among the most recent patents introduced to the public, we notice a protective brake, which consists in the attachment to a chain brake of horizontal bars, arranged in such a way that any object that may lie on the rail will be instantly thrown off. It will keep any object, however small, that may fall either in front or between the wheels, from being struck by them.

—The marine losses of the United States for the eight months ending on the 31st day of August, amounted to three hundred and sixty seven vessels, valued at $10,064,800, as compared with 203 vessels valued at $8,021,000, during the corresponding period of 1865.

—An immense brick yard, 800 feet long and almost 400 feet wide, is about to be established at Chicago, Ill. It will contain machines for the manufacture of 200,000 bricks a day. A canal 2000 feet long 200 feet wide and 20 feet deep, will connect the yard with the south branch of the river. The excavated earth will be used in the manufacture of bricks.

—A railroad bridge is about to be constructed across the Ohio River at Louisville Ky., at a cost $1,500,000; which will be a great advantage to the inhabitants of that region. It is computed that in the single item of freight between Louisville and New York the gain to shippers will be fully 33 per cent.

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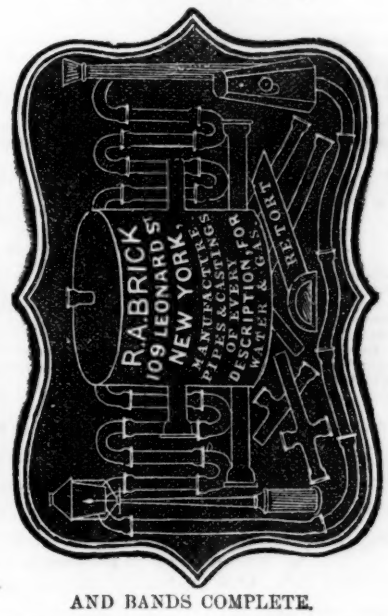

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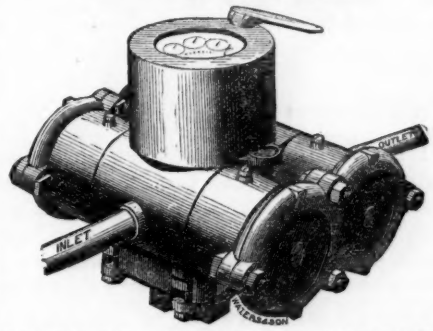

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Profs. Partz & Buck, Consulting Chemists.

TUESDAY, OCTOBER 2, 1866.

Wishing to make this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its colums are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

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Standard Gas, Carburetting, &c.

It is generally understood that carburetted hydrogen or the ordinary coal gas, as manufactured by gas companies, has a standard illuminating power generally estimated by the comparison of the light of a 5-foot gas burner at a given pressure, with the number ot wax candles required to equal it by photometric measurement.

The gas burned from a 5-foot gas burner, at a water pressure of 4-10 of an inch, that will equal the light of 14 or 15 wax or spermaciti candles, six in the pound, consuming 120 grs. per hour, is considered a fair standard gas. And this is the acknowledged standard which most companies adhere to.

It has been found by numberless experiments and tests, that gas which has a much higher candle standard (meaning that it has a larger proportion of carbon to its hydrogen), is liable to condense in the mains and service pipes, at certain temperatures of the climate, and is liable to be a source of great annoyance to the gas companies; requiring much labor to pump the mains out and keep them free. It also gives much trouble to the consumers by condensing in the service pipes, and accumulating in the bends and elbows, in some instances producing a flutter ing or vibration of the light most destructive to the eyesight, by inducing paralysis of the optic nerve; and it is extremely trying to the temper, especially when, at some critical moment the pipes become completely obstructed, and total darkness suddenly supervenes.

These results are most apparent in cold weather, and in dwellings where the gas pipes pass out of warm rooms into cold or exposed places, so as to reduce the temperature much below that of the street mains. In such cases the rich carbons of the gas are deposited in the form of an oil or tarry matter, which by gravity seeks the lowest place in the pipes, where it gradually accumulates to produce the unpleasant effects before mentioned. Aside from other considerations, this condensation is a positive loss to the gas companies of no small importance; for every ounce of gaseous, ethereal or volatile elements condensed is equal to a certain number of cubic feet of gas, manufactured for, but not consumed by or accounted for by the consumer.

CARBURIZATION OF ILLUMINATING GAS.

It is well known that ordinary standard gas can be passed through or over hydro-carbon fluids of light specific gravity at proper temperature, so as to take up or absorb a certain ethereal or volatile principle by evaporation, so as to increase the illuminating power or candle standard of the gas. This is called carburetting or carbonization of the gas, and has been practiced to a limited extent; or rather experimented with for many years, both in this country and in Europe. But it has never been successfully, continuously done in a large way for any considerable period that we are aware of.

Many patents have been taken out for carburetting gas, mostly device patents for apparatus differing in form, but not in principle, and all up to the present time, so far as we are aware, open to the objections of condensation in the pipes, liability to accident by careless handling of the carbonizing fluid, and the general inconvenience of filling the apparatus, and keeping it in order. The most simple apparatus is generally a vessel of tin or other metal attached near the meter, or to any portion of the service pipe, containing a series of shallow pans, or compartments one above the other, which are filled with naptha, benzole, "gasolene," &c., and the gas passed successively into and through the compartments, and over the surface of the fluid which charges it with hydro-carbon vapor. Sometimes sponge, sand, sawdust, cloth, wicking, wire-gauze, or other porous material is used to increase the exposed surface to the action of the gas, and facilitate evaporation.

The list of this kind of improvements are too numerous to mention; Mr. Ashcroft, of Boston, was one of the first which came into notice many years ago, and was introduced considerably; Mr. Amsterdam, Bronson, and Gywnne, are the next which came prominently before the public; but all went out of use after a time for the reasons previously stated.

There are at present two or three new inventions of this class before the public which we are investigating, one especially, which is attracting considerable attention, because the inventor claims to obviate or overcome *all* the former difficulties. It is said also the material costs little or nothing to manufacture, owing to the formation of other valueable marketable products which can be sold at a profit sufficient to cover the entire cost of manufacture. We are waiting for further developments, which we are promised in regard to this invention, which will be given to the public soon.

AIR-LIGHT.

Atmospheric air can be charged with hydro-carbon vapor to render it combustible and illuminative in a similar manner as described, for enriching common gas; but requires an automatic apparatus in connection with the carbonizer to pump or force the air through it *en route* to supply the lights at the points of combustion. Various devices for this purpose have been patented.

The Hill and Griffin patents were among the first in this country which claimed the public attention for a time. Of late much inventive genius has been expended in this direction to simplify and perfect the apparatus, and every week the Patent Office Reports contain from one to several inventions of this description.

Those most known and in use at the present, so far as we remember, are the Griffin, McDougall, Chase, and Stevens patents. The latter seems to meet with most favor since it has been perfected, manufactured and introduced by Messrs. Mitchell, Vance & Co., 620 Broadway, New York. For isolated dwellings, villas, factories and the like, remote from gas works, some of these machines afford a cheap and very good substitute for gas.

Philadelphia Gas Works.

Notwithstanding the assaults which the Board of Trustees of the Philadelphia Gas Works have been subjected to, they have progressed in the "even tenor of their way," and by the improvements made, and now being made, in their works, in the city and at Point Breese, show that in the main they are economizing the expenses of the works very largely, especially in the details of the establishment. Not less than one hundred thousand dollars per annum will be saved to the city consequent upon the changes and additions made, and being now completed at the City Gas Works, under the direction ot the Chief Engineer, Joseph Manuel, Esq., besides adding to the good appearance of the works.

We are gratified, also, by observing the construction of their large office, in Seventh street. It was quite time for an institution of the magnitude of the Philadelphia Gas Company to have more appropriate and convenient apartments for the transaction of their immense business.

We await the completion of the New Iron Retort House, and the other buildings, with the expectation of enjoying much satisfaction, and feel confident that the trustees will receive from their constituents the always coveted commendation, "Well done good and faithful servants."

Merrick & Sons—Southwork Foundry, Philadelphia.

A late visit to this foundry proved to us that what may appear a calamity at the time of its occurrence does not always prove so in the result. Prom some flames a Phenix will arise compensating for the destruction which has taken place. The beautiful and extensive buildings, which have been erected by Messrs. Merrick & Sons, in the place of those burned, meet all the requisitions for their vast operations, and the conveniences for handling and removing from room to room the large machinery they manufacture, are complete. Notwithstanding the disappointment (consequent by the fire) to many parties at not having their orders executed, as expected, and although the pecuniary loss to the concern was great; yet as such benefits have resulted, we can be reconciled to the disappointments of the first, and knowing that the concern could lose what they did without inconvenience to their business future, or causing themselves any personal unhappiness, we can be reconciled to that also.

Gefrores's Gas Stoves and Heaters.—We present a variety of patterns of Gefrorer's improved Gas Heating and Cooking Apparatus on the last page of our present number. The plan of heating and cooking with gas, has brought out much mechanical talent, and we find the beautiful as well as thd useful in the late patterns manufacturered. Mr. Gefrorer is a very intelligent mechanic, and practical in his operations; hence his productions are entitled to the approbation they receive.

Lanterns.—In consideration that lanterns are so much used it is well to notice a really good improvement in them. We have seen nothing which so fully meets the repuirements as Smith's improvements, which will be understood by refering to the advertisment on the next page of J. O. Smith & Sons. We shall refer to this more in detail hereafter.

Screening Shovels.—We have inquiries for screening shovels for gas-works. Parties engaged in manufacturing these or similar articles will forward their own interests by advertising in this Journal.

Improved Gas Exahauster.

We have lately examined a valuable improvement in Gas Exhauster, perfected by Mr. Charles W. Isbell, Secretary of the firm of Smith, Sayre & Co., 484 Broadway. The compensator, which is attached to and is a part of the Exhauster, is formed like a miniature gas-holder, being an inverted metallic cup dipping into and floating in an annular mecurial bath and connected with a pipe leading from the exhaust over to the pressure side of the exhauster. This connecting pipe has a valve attached to and operated by the inverted cup as it rises or falls by the varying pressure in the pipe and serves to let a portion of the gas return, to supply the exhaust when the pressure is too low, thereby equalizing the pressure in the retorts at all times.

The cup is also connected with an index and a dial by a simple mechanism, so the pressure can be read off at a glance. The principal novel feature in the improvement is in having the annular chamber containing the mercury expanded at the bottom so as to avoid friction and clogging by any impurities in the gas, and at the same time economize the amount of mercury required. The whole apparatus is compact and neatly enclosed, and rests upon the exhauster case, forming an oruamental addition to it.

New Books.

BUSINESS DIRECTORY OF THE PRINCIPAL SOUTHERN CITIES, comprising New Orleans, Savannah, Augusta, Mobile, Charleston, Memphis, and Richmond. DUNKLEY & WOODMAN, Publishers, 34 Liberty-st, New York.

The above is the title of a publication just issued from the press, which commends itself to the notice of all business men north, south, east, and west. Besides being a complete Business Directory of the above named southern cities, it contains the names all merchants, manufacturers and dealers who already have, or desire to have, business relations with the south. Its advertisements are well displayed, the circulation greater than that of any directory ever published in the United States, and from personal knowledge we are enabled to recommend it as being as nearly perfect as can be. Its importance to business men is so very evident that any recommendation of ours would be superfluous. It is for sale by the publishers at 34 Liberty-st.

CLEGG, JR., ON THE MANUFACTURE OF COAL GAS: Fourth Edition. Samuel Clegg, Jr., M., I N S T., C. E., F. R. S. John Weale, London.

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The standard for density being 15° Baume's scale.
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Glycerin for Printers' Rollers.
It is coming into general use for this purpose, as rollers will not dry and shrink as when made in the usual way.

OFFICE OF THE DAILY & DOLLAR WEEKLY TIMES, CINCINNATI, Nov. 27th, 1865.
I hereby certify that I have used the Glycerin manufactured by the Messrs. W. J. M. Gordon & Bro., of this city, in the manufacture of printing rollers, and find it a most valuable addition to the composition in general use. THOMAS F. WINTER,
Pressman Times Office, Cincinnati, O.

November 29, 1865.
We have used the Glycerin manufactured by W. J. M. Gordon & Bro, of this city, for the last seven years. We find it in our line of business—printing playing cards, using colored inks to a great extent,—a very superior and indispensable article. We use about one-sixth quantity of it to the amount of molases in making our rollers. We find it prevents them from shrinking up, and causes them to retain the desired "tack." We confidently recommend the article for the desired purposes. LONGLEY & BROTHER,
Playing Card Manufacturers, Cincinnati, Ohio.

Glycerin is also used by the Cincinnati Commercial and Enquirer, to whom we refer.
We manufacture Glycerine of every quality used, and from our advantage in material we are enabled to sell it lower than any manufacturer in the country.
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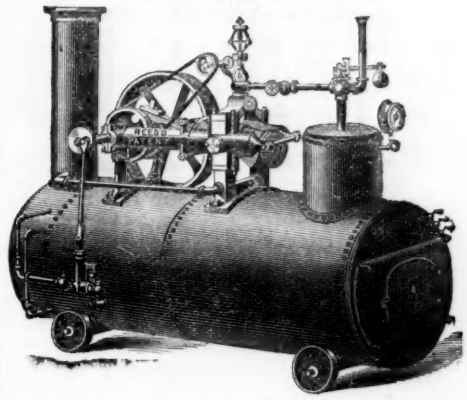

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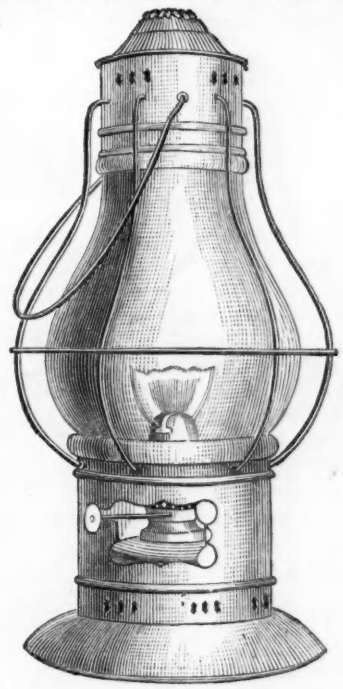

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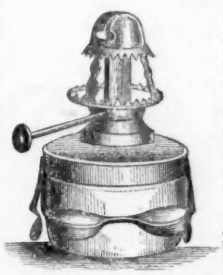

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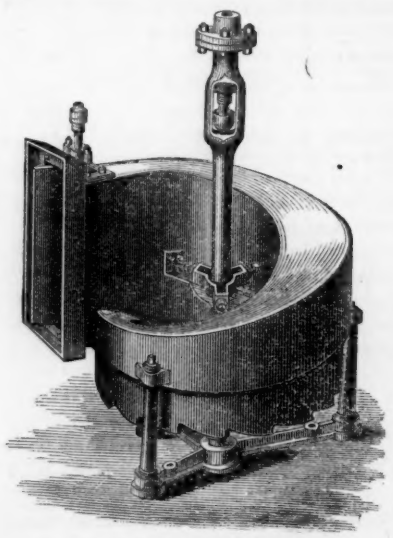

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375	36	94 00	22 00	116 00
450	84	112 00	25 00	137 00
600	02	150 00	30 00	180 00
750	89	188 00	35 00	225 00
1,000	64	250 00	42 00	292 00
1,200	48	300 00	45 00	345 00
1,400	50	350 00	50 00	400 00
1,600	52	400 00	54 00	454 00
1,800	55	450 00	60 00	510 00
2,000	58	500 00	62 00	562 00
2,500	60	625 00	72 00	697 00
3,000	63	750 00	85 00	835 00
3,500	66	875 00	87 00	962 00
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4,500	72	1,125 00	113 00	1,238 00
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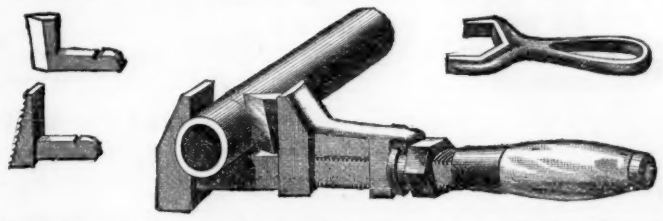

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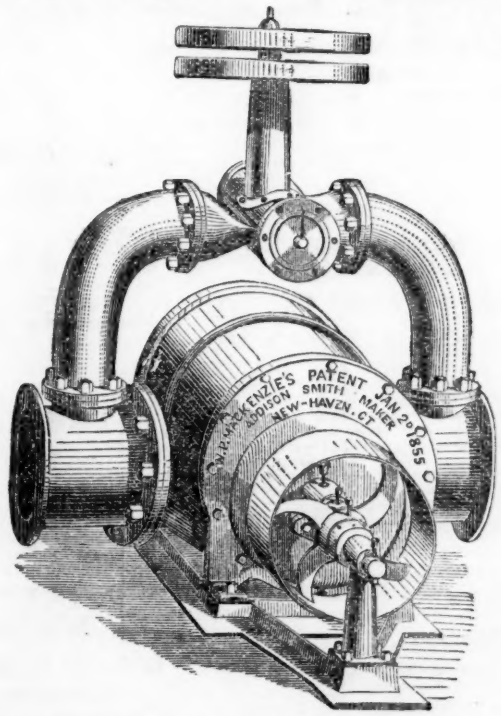

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 ons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address

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Six years in general use in works using it, to the exclusion of all other fluid, and driving the dry meter out of use, enables us to recommend the patent with perfect confidence.

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The process of reconstructing Slate Stone from a disintegrated state was

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☞ SEND FOR CIRCULAR AND PRICE LIST. ☜

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Missouri,	..	"	14	Missouri,	..	"	11
San Salvador,	..	"	21	San Salvador,	..	"	17
Missouri,	..	"	28	Missouri,	..	"	24

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For Washington, 8* and 10,00* a. m. and 6*, 7* p. m. and 12* Midnight. Sleeping cars attached to 7 p. m. Express trains marked thus *

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For Elizabeth, 6, 7, 8 20, and 10 and 11.40 a. m.; 12 m; 1, 2, 3, 3.30, 4,10, 4.30, 5, 5,10, 5.40, 6.10, 7.10, 8.20, 10 and 12 p. m.

For Rahway, *6 (stopping at Market Street only, Newark) 7, and 10 a. m. and 12, 2, 3.30, 4.10, 4.30, 5.10, 5.40, 6.20, 7.10, and 12 p. m.—Sunday, 6 p. m.

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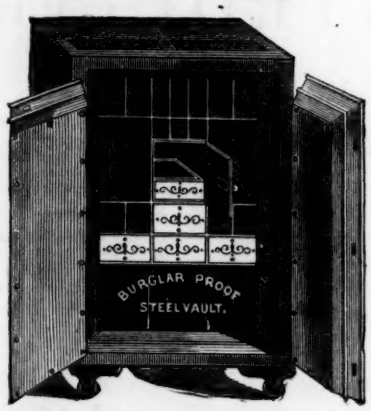

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3	20	15	12½	120	2½	32	33	16	400
4	21¼	21¼	13	150	3	38	24	16	350
5	26	18	13	220	4	44	24	16	400
6	22½	26	14	250	5	44	32	17	500
7	26	21	14	240	5½	40	38	17	525
8	29	24	14½	300	6	50	32	17	550
9	32	22	14½	300	7	50	88	17	600
10	32	27	14½	350	8	56	38	18	750
					9	56	44	18	850
					10	64	51	19	1000

NOTICE—Parties ordering Safes can have any Lock they desire.

Jewelers' and Banker's Safes Made to Order, Lined with Hardened Steel or Chilled Iron.

HOUSE AND PLATE SAFES.

☞This CELEBRATED SAFE has been tested in all the Large Fires during the past 31 years, including the great fire in New York City A. D. 1835, and the thousands of certificates from Merchants, Bankers, and Mechanics of all trades, that have been given to this, the ONLY TRUE "SALAMANDER," renders it useless for the subscriber to multiply words in its favor, as full twenty-five thousand of the Salamander Safes have been manufactured and sold in the United States; and in almost every large fire that has taken place during the last thirty years, these safes have been subjected to the severest tests, and NOT ONE of the genuine Salamanders has ever been destroyed.

☞A good assortment of New and Second-hand Safes constantly on hand

O. C. QUIRK.

155 Warehouse No. 28 Liberty Street.

JOSEPH NASON & CO.,

No. 61 Beekman street, corner of Gold,

NEW YORK.

Manufacturers of WROUGHT IRON PIPES and Fittings for Steam, Gas and Water, Boiler Flues, Steam Boilers, Coils, Heaters, Evaporators, Pumps, Ventilating Machinery, and Apparatus for Warming Buildings by Steam and Hot Water.

OIL TUBING, CAST IRON DRIVING PIPE,

Boring Tools, Oil Pumps, Sand Pumps, Stuffing Boxes, Tongs, Clamps, Swivels, Joints, &c. 131

BIRD, PERKINS & JOB.,

(Formerly J. P. Melledge & Co.,)

General Commission Merchants,

And Importers of

PROVINCIAL COAL,

For Gas, Steam and Iron Manufactures.

39 India Wharf,..... .....Boston.

SAM'L T. BIRD, JAMES D. PERKINS, DANIEL W. JOB. [134

Represented in New York by GEORGE H. BREWER, No. 104 Wall Street.

EDDY'S

Kerosene Cooking & Heating

STOVES AND RANGES.

THESE COOKING STOVES WILL

☞*Bake, Boil, Stew, Fry and Roast,*

With the greatest economy and facility, and without heating the room in which they are used. They are perfectly simple, operating like an ordinary Kerosene Lamp with a chimney, and are the only Kerosene Stoves that burn without smoke or odor.

"We have been perfectly astonished to see what a labor-saving, dirt saving and heat-saving institution is EDDY'S PATENT KEROSENE STOVE. Taking the cost of running it, and the result attained, it is the best patent in the market."—*Worcester Daily Spy.*

Our Heating and Cooking Stoves are very convenient and economical, especially where a fire is required but a few hours at a time.

Orders for Stoves may be sent through American Advertising Agency, 389 Broadway, New York.

LESLEY & ELLIOT,

Manufacturers, No. 494 Broadway, New York.

Send for Illustrated Circular. (136

KNITTING MACHINES

FOR

Families and Manufacturers,

☞*Something New and Invaluable for Family Use.*

We offer the public the simplest, strongest and best Knitting Machine in the world.

It occupies but little space—is portable and can be attached to a stand or table, weighs about 40 lbs.

It will knit a variety of Stitches—the breakage of needles is trifling—the cost of needles is insignificant and the most delicate material can be knit pure and spotless, as the needles are not oiled.

Orders for Machines may be sent through the American Advertising Agency, 389 Broadway, N. Y.

Send for a Circular—Agents wanted.

DALTON KNITTING MACHINE CO.,

137] 537 Broadway, N. Y.

WEED'S

HIGHEST PREMIUM

Shuttle Sewing Machine

Has only to be seen and operated to be Appreciated.

Call and see for yourself before purchasing. Please bring samples of various kinds of thread, (such as is usually found at stores,) and various kinds of fabric, which you know the former most popular Sewing Machines either cannot work at all, or, at best very imperfectly.

SUPERIORITY.

over any other Machine in the market will be seen at a glance.

1st It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.

2d. No breaking of threads in going over seams.

3d. No imperfect action of the feed at uneven places in the work.

4th. The Weed-stitch catches of itself, and will sew from the finest lace to the heaviest leather, and 20 cotton to coarse linen thread.

5th. The Weed Machine will do beautiful quilting on the bare wadding, without using inner lining; thus leaving it soft as if done by hand.

6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, makes it equal, if not superior, to six machines combined; for instance. it Binds, Hems, Tucks and Sews on the band at the same time, and in face, the

WEED NO. 2 MACHINE,

as before stated, is equivalent to a combination of any six ordinary machines.

Orders for Machines may be sent through the American Advertising Agency. 389 Broadway, N. Y.

Below we give a few prices:

No. 2. Oil Black Walnut, Ornamented with Hemmer.	$60,00
No. 2. Oil Black Walnut, Hall Case, Ornamented, with Hemmer.	65,00
No. 3. Extra Oil Polished Black Walnut, Half Case, Large Table beautifully Ornamented.	75,00

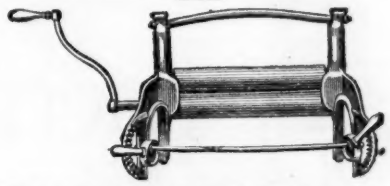
WEED SEWING MACAINE Co.,

136) 506 Broadway, New York

PUTNAM'S CLOTHES WRINGER.

IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog-wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day.

WHAT EVERYBODY KNOWS, VIZ.:

That Iron well galvanized *will not rust.*

That a *simple* machine is better than a complicated one.

That a Wringer should be *self-adjusting, durable, and efficient.*

That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.

That wood soaked in water will *swell, shrink,* and *split.*

That wood-bearings for the shaft to run in *will wear out.*

That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*

That cog-wheel regulators are not essential.

That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.

That all who have tried it pronounce it the *best* Wringer ever made.

That it will wring a thread or a bed-quilt *without alteration.*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, if such there be; and we say to all, *test* Putnam's Wringer. Test it *thoroughly* with *any* and any others, and if not entirely satisfactory, return it;

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

JOHN W. WHEELER, Cleveland, O.

Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*

JOHN C. LEFFERTS, No. 100 Beekman St.

NEW YORK, *January,* 1864.—We have tested Putnam's Clothes Wringer by practical working, and know that it will do. It is cheap; it is simple; it requires no room, whether at work or at rest; a child can operate it; it does its duty thoroughly; it saves time, and it saves wear and tear. We earnestly advise all who have *much* washing to do, with all intelligent persons who have *any,* to buy this Wringer. It will pay for itself in a year at most. HORACE GREELEY.

PRICES—$8, $9, and $10.

Sample Wringers sent, express paid, on receipt of price.

Manufactured and sold, wholesale and retail, by

PUTNAM MANUF'G CO.,

13 PLATT STREET, New York,

BENNINGTON, Vt.,

CLEVELAND O.

WATER AND GAS PIPE.

The Boston Bituminized Pipe Company,

Are now manufacturing and prepared to take orders, for their PATENT PIPE, (from 2 to 12 inches in diamter,) as a substitute for Iron, Copper, Lead, &c., for the conveyance of WATER, GAS, SEWERAGE, &c. &c.

From the testimonials received, and the entire satisfaction it has given those having it in use, we feel warranted in claiming for this pipe over that of any other, the following advantages, viz:

It is much CHEAPER—has great strength (it having been tested to 500 lbs. to the square inch,) combined with LIGHTNESS, costing less for transportation; the joints are easily made and perfectly tight; it does not expand or contract from different degrees of tempera ture, and is free from *CORROSION* or *CONCRETIONS* forming; does not impart any taste or injurious properties to water, and as far as anything can be said to be indestructible, we deem this to be.

As a GAS PIPE, we say it has no superior. The Lowell Gas Light Co., purchased and laid some of this Pipe last year, and have likewise subjected samples to a test of four month's duration in their dry lime purifiers, with the most satisfactory results, in fact establishing beyond a doubt, its perfect adaptation to the wants and requirements of Gas Companies. specimens of which, together with the statement of E. Cushing, Esq., Agent Lowell Gas Light Co., who made these experiments, I shall be pleased to show, and give all other needed information, by applying in person, or by letter, to JOHN L. WEBSTER, Treas.,

Boston Bituminized Pipe Co.,

127] No. 2 Pearl st. House, Boston.

AMBROSE SPENCER GILCHRIST.

(LATE CAPT. U. S. V.,)

CIVIL, MINING

AND ARCHITECTURAL ENGINEER,

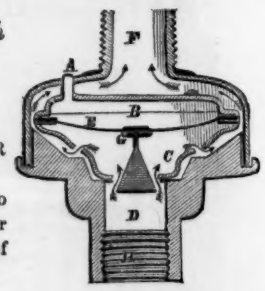
No. 200 BROADWAY, Office 12.

New York.

NOTICE TO GAS COMPANIES AND GAS CONSUMERS.

THOMPSON'S PATENT GAS CONTROLLER,

The only Self-Acting Gas Controller, Regulator, and Burner Combined which has ever been invented, or known to science.



THE PRINCIPLE UPON WHICH THE THOMPSON'S AUTOMATIC GAS CONTROLLER works is one well known to mechanics, and is simple in its operation.

Within the circumference of a small cylinder below the burner is placed a conical valve attached to a movable diaphragm. The diaphragm rises or falls as the pressure of gas from the pipe is lesser or greater, and the valve acts upon the valve-seat with such regularity of movement that in a difference of from five-tenths of an inch pressure to five inches the variation in flame is hardly perceptible.

The simplicity of its machinery and the nature of the material used in its construction insure its regular action and durability.

In consequence of the uniform quantity of gas which passes the Controller to the burner, there is no waste, and a steady, soft flame is produced, which is important to all who read, write, or work by gas-light. The unsteady flickering blaze which invariably exists when the pressure of gas is beyond the requisition for consumption, has injured the sight of thousands who have been subjected to it.

For street lamps these Controllers are especially valuable, because the pressure varies materially during the night, and in consequence there is a waste of gas, and the light variable.

Improvements have lately been made in the mechanism of the Controller which makes them almost a perfect meter to each ourner, and they are now offered to he public with more confidence than ever before.

Reference is permitted to the following named gentlemen—

Col. CHAS. ROOME, President Manhattan Gas Company, N. Y.
C. H. SAND , Esq., President Metropolitan Gas Company, "
J. H. ADAM, Esq., President New York Gas Company, "
PETER COOPER, Esq., Cooper Institute, "
JOHN A. DUFF, Esq., Olympic Theatre, "

GEO. H. KITCHEN, Inspector of Gas Meters, N. Y
A. L. BOGART, Esq., Gas Engineer.
Col. J. A. SABATTON, Engineer Manhattan Gas Company.
Col. A. J. WHITE, Engineer Metropolitan Gas Company.
J. K. SIMPSON, Esq., Engineer Cooper Institute.

Persons interested are invited to call at the Office, 28 Liberty street, where they can see the operation by pressure guage and test meters]

M. L CALLENDER, Agent
Office, 22 PINE STREET.

JOSEPH LEES, San Francisco, Agent for California and Oregon.

THE AMERICAN METER CO.

Organized under the General Manufacturing Laws of the State of New York

SAMUEL DOWN, President. HENRY CARTWRIGHT, Vice President. RICHARD MERRIFIELD, Secretary and Treasurer

Trustees.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS & REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West Street, Boston will meet with prompt attention.

Harris & Brother, Practical Gas Meter Manufacturers,

Continue, as heretofore at their old Establishmen, No. 1117 CHERRY ST., PHILADELPHIA, to Manufacture

WET AND DRY GAS METERS, and all kinds of GAS APPARATUS, and furnish all articles appertaining to the use of Gas Works. ☞OUR WORK WARRANTED—Satisfaction Guaranteed. Orders respectfully solicted, and promptly attended to, by
HARRIS & BRO., No 1117 Cherry st., Philadelphia.

Messrs. Harris & Brother, Philadelphia Gas Works, February 14, 1857.

Dear Sirs;—I take great pleasure in stating that we have found your meters to register with entire correctness, and to be generally of very good quality—the number furnished by you to these works is over 5,000.
JOHN C. CRESSON, Engineer;

Office of the Gas Light Company of Augusta, Ga., March 6th, 1858.

This is to certify that having used meters manufactured by Messrs. Harris & Bro., for the last nine years, we do not hesitate to state they have given entir8 satisfaction in point of wokmanship and accuracy of registration; they are surpassed by none, and equaled by few manufactories in the Union; we have used meters made by other establishments; but our preference is in favor of those made by Harris & Bro., of Philadelphia, Pa.
G. S. HOOKEY, Superintendent of the Gas Light Company of Augusta, Georgia.

Messrs. Harris & Brother, Philadelphia. Philadelphia, March 4, 1858.

Gentlemen—We take great pleasure in bearing our testimony to the very superior character of the meters we have received from your establishment. We have always found the workmanshipall we could desire, while the accuracy and reliability of their measurement have always been satisfactory. We have used meters made by other parties, and none have given as entire satisfaction as those received from you. We are, gentlemen, very truly, yours, BIRKINBINE & MARS.

Messrs. Harris & Brother. March 14, 1857.

Gentlemen—For the last ten years we have used in the Philadelphia Gas Works, meters made in your factory, and take pleasure in expressing my opinion to their correctness. On several occasions I have taken your meters apart, and found the material used in the manufacture of the same, to be as fine quality as is used in those imported from Europe, or made by any of the manufactur in the United States. Respectfully Yours, GEORGE WIEGAND, Inspector of Gas Fittings, Philadelphia.

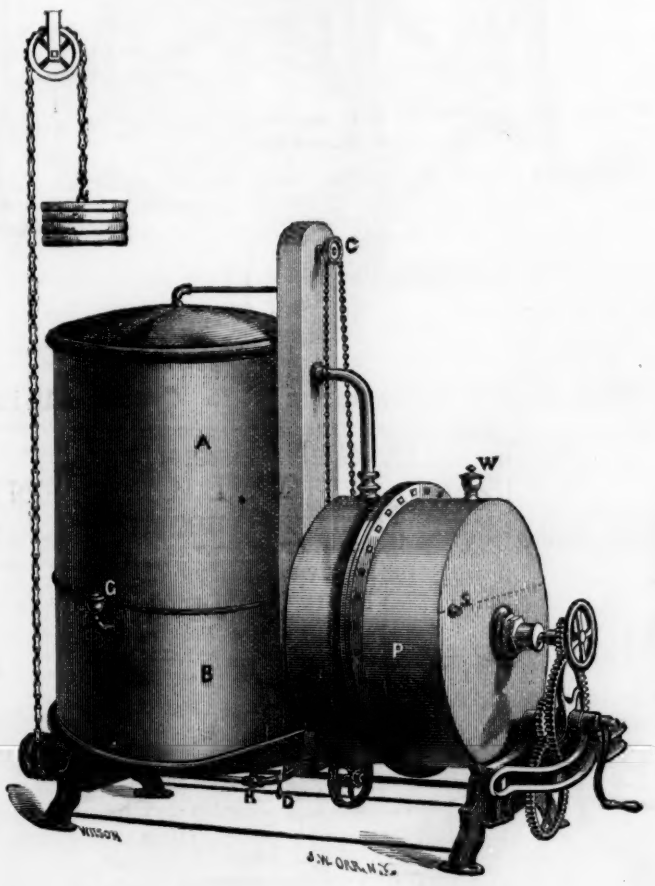
EMPIRE STATE GAS MACHINE,

LEVI STEVENS' PATENT, FOR SUPPLYING,

Dwellings. Stores, Factories and Public Buildings.

THE GAS GENERATED BY THIS MACHINE

Is a mixture of the vapor of hydro-carbon with common air. The mechanical devices employed are such as, from a long experience and critical examination into the nature of the element brought into use, seam best adapted to secure a certain and satisfactory result. GASOLINE, the liquid employed, is the more volatile portions of Petroleum, of a specific gravity of 0.6587. This liquid exposed to the action of this machine is vaporized, and a close mechanical mixture of the vapor with common air is effected. The value of the gas produced, its permaneney, its illuminating quality, and freedom from liability to condensation, depend almost entirely upon the perfect and uniform character of this mixture. Hence the great importance of mechanical means adapted to secure all the conditions requisite in a Portable Gas Machine.



THE PRICE-LISTS OF MACHINES COMPLETE;

(Boxed and delivered on the cars at the Manufactory.)

No. 1,	$150,	5	Argand Burners.
do. 2,	250,	10	do. do.
do. 3,	350,	20	do. do.
do. 4,	450,	35	do. do.
do. 5,	600,	60	do. do.
do. 6,	1,000,	125	do. do.
do. 7,	1,500,	250	do. do.

This machine will produce the most brilliant and steady light without Fire or Heat, and is warranted to operate in every respect as represented.

The EMPIRE STATE GAS MACHINE is the most SIMPLE and EFFECTIVE MEANS KNOWN FOR PRODUCING GAS WITHOUT HEAT.

Its action is automatic, feeding itself with constant supplies of Gasoline, thus securing steady and uniform supplies of Gas. The gas produced is equal to the best known Illuminating Gas. It is as economical as any other, and is adapted to a wider range of use for Lighting, Heatin and Mechanical purposes. It will maintain its illuminating power under as great a degree of cold as any other. It is free from danger with the ordi nary care in using gas. Its remarkably pure and steady light is pleasant for the eye. It renders it easy for persons living remote from street gas pipes to enjoy the luxury of a pure GAS-LIGHT, at a COMPARATIVELY SMALL COST, AND WITH LITTLE TROUBLE.

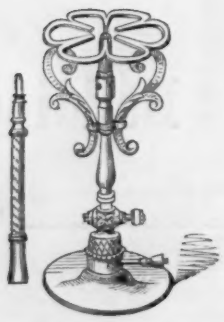
☞ The public are invited to witness its operations at our store. GASOLINE will be supplied by us, at market prices, or may be obtained from the various other sources of supply now going into operation.

MITCHELL, VANCE & Co., 620 Broadway, New York,

Manufacturers of Chandeliers and Gas Fixtures of every description. Also, Chandeliers, Brackets, Lamps, &c., for Coal Oil, adapted to Churches,

Public Buildings, Dwellings, &c.

C. GEFRORER'S
Improved Gas Heating and Cooking Apparatus.



Consumption, 3 feet.

COOK STOVE—Consumption 30 ft. Oven 15 x 19 in.

Consumption, 4 feet.

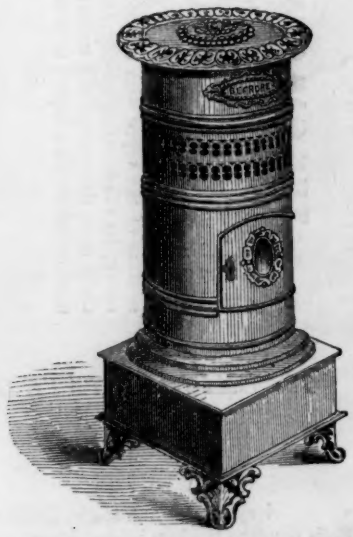
Consumption, 6 feet,

Consumption, 12 feet.

C. GEFRORER,
Manufacturer of
Gas Heating Apparatus
OF EVERY DESCRIPTION,
No. 259 COMMERCE STREET,
PHILADELPHIA, PA.

COOK STOVE—Consumption 20 feet.

Chaffing Dish—Consumption 7 ft.

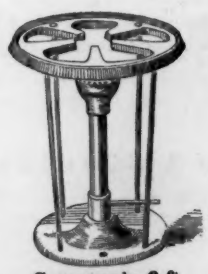


Office Stove—Consumption 12 ft.

Consumption 12 feet

Consumption 10 feet.

Consump'n 6 ft.



Consump'n 6 ft.

Nursery Heater.

Consump'n 2 ft.

OCT. 15, 1866